

# Fermilab Test Beam Facility

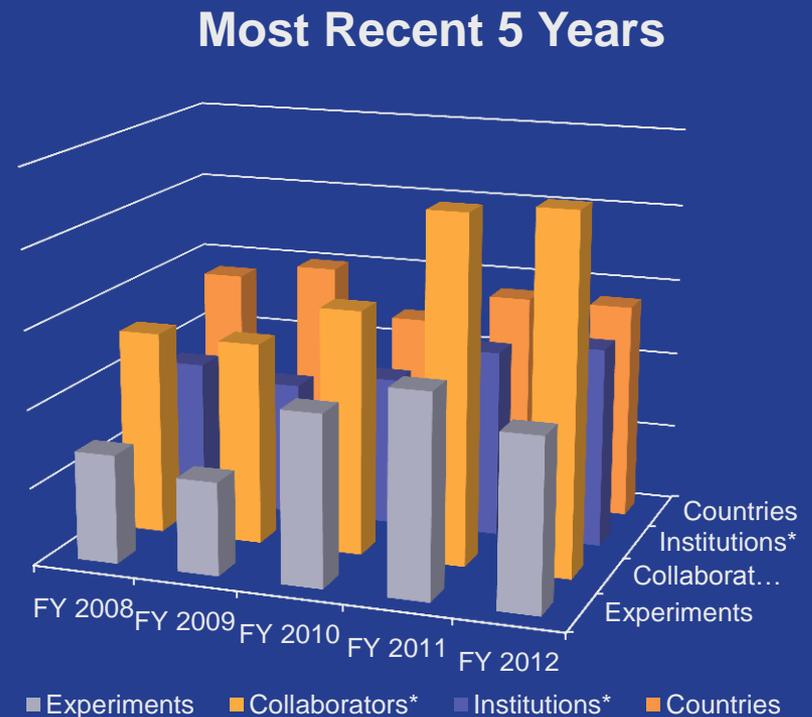
Aria Soha  
Fermilab Annual Science and Technology Review  
September 5-7, 2012

# Outline

- Facility Infrastructure
- Beam Details
- Performance:
  - Experiments served
  - Weekly Usage
- Upgrades & Expansion
- Summary

# Fermilab Test Beam Facility

- Only US high energy hadron Test Beam
- In FY 2012 served:
  - 11 Experiments
  - 229 Collaborators
  - 64 Institutions
  - 14 Countries



# Facility Infrastructure

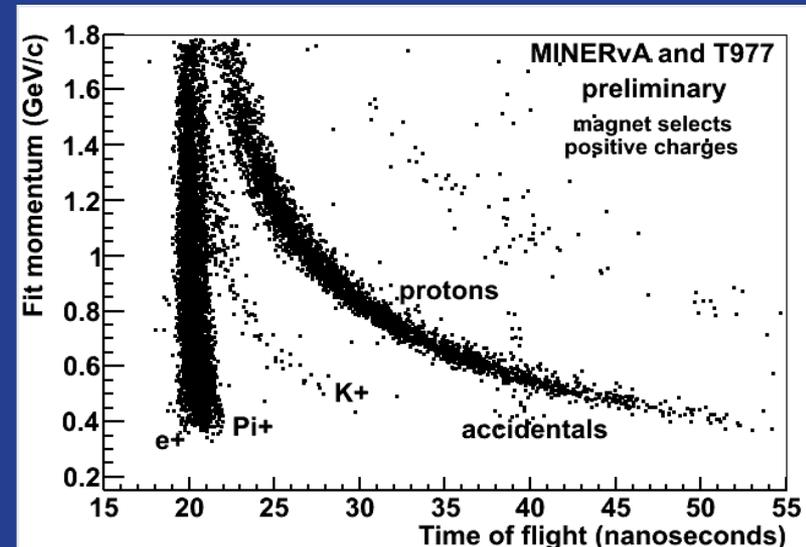
- Climate-controlled areas for experiments
- Remotely controlled motion tables
- Laser alignment
- Web-based Cameras
- Gas Delivery
- Signal, HV patch panels
- Network patch panels

## **Instrumentation:**

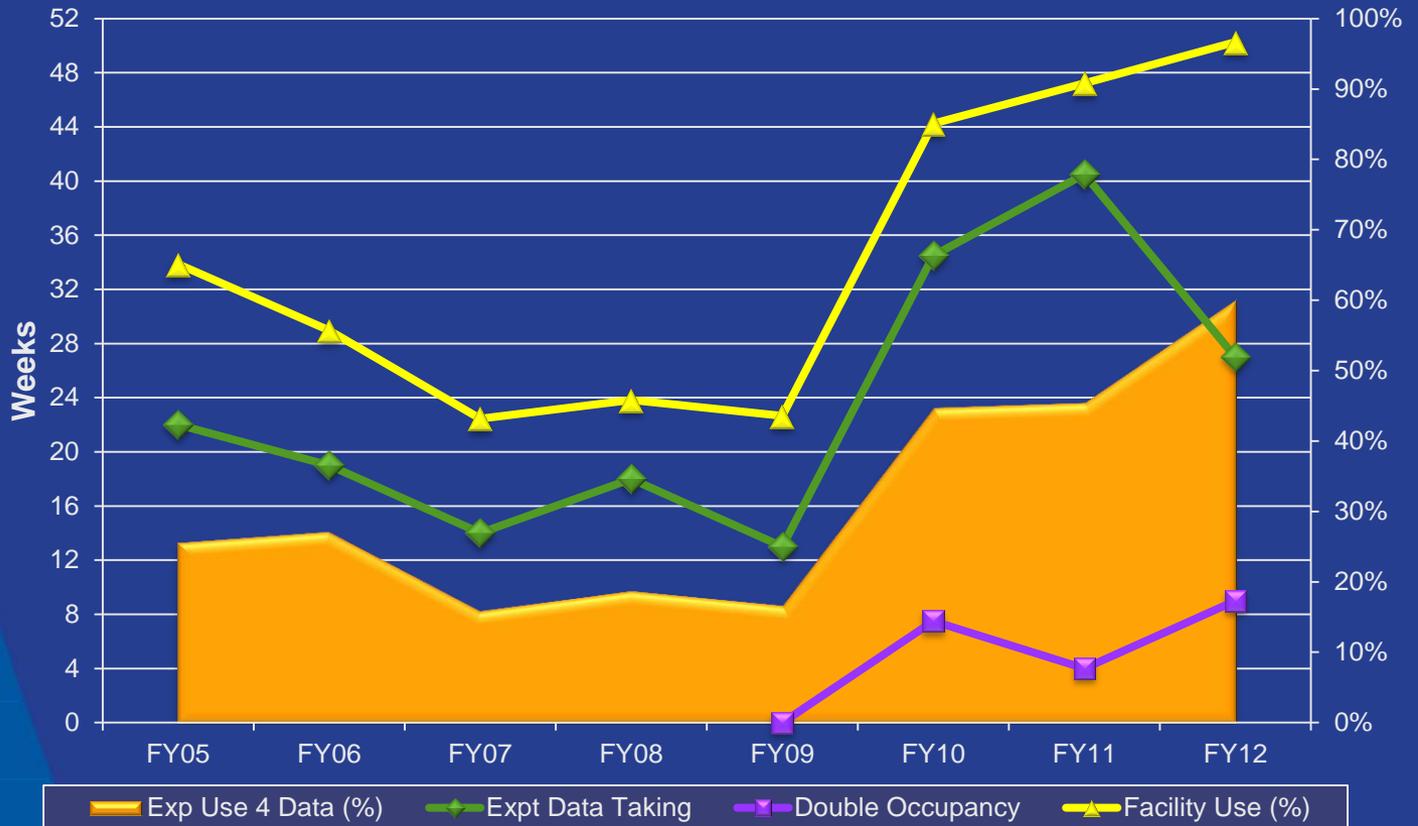
- 2 Cerenkov Detectors
- Pixel telescope
- 4 MWPC Tracking system
- Time of Flight system
- Lead Glass Calorimeters
- Assorted Trigger Scintillators

# Beam Details

- 6 sec event (4.2 sec spill) every 60 seconds
- Multiple particle types & energies
  - 120 GeV Protons
  - 2 – 66 GeV Pions
  - 0.5 – 32 GeV Electrons
  - Broadband muons
- 1 – 300 kHz intensities
- Tertiary Target
  - Pions, protons (60/40)
  - 200 MeV – 1 GeV
  - 50Hz intensities



# Weekly Usage



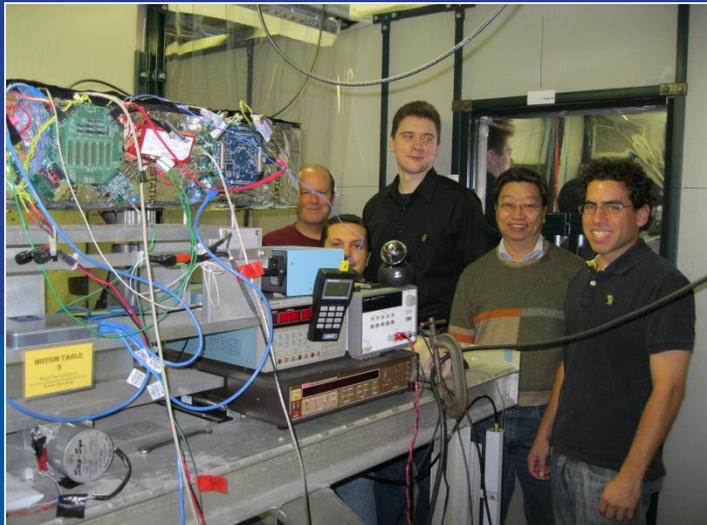
- FY2012 only consisted of 7 months of beam
- Facility Use includes Beam studies, and educational support such as EDIT 2012.

# FTBF Experiments in FY 2012

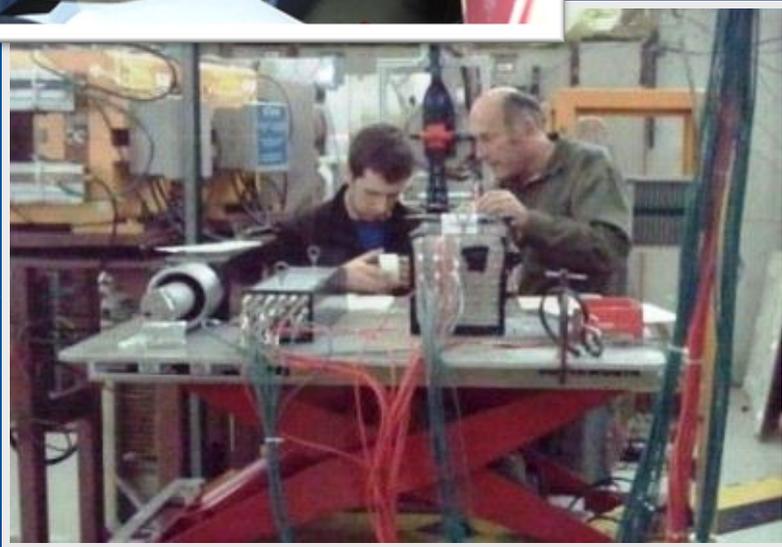
- T-958 FP420 Fast Timing Group
- T-978 CALICE
- T-979 Fast timing for PSEC
- T-992 SLHC Rad Hard Sensors
- T-1005 Muon g-2 Calorimeter
- T-1008 SuperB Prototype
- T-1012 TAUWER Test
- T-1015 Dual Readout Calorimetry
- T-1017 CIRTE
- T-1018 Spacordian
- T-1019 Belle II iTOP Counter
- EDIT 2012 Symposium

# T-992 SLHC Rad-Hard Detectors

- Diamond Detectors
- 3D Detectors
- Pixel telescope
- 10 US institutions
  - Fermilab Comp Div
- 1 Italian institution



# T-1005 Muon g-2 Calorimeter

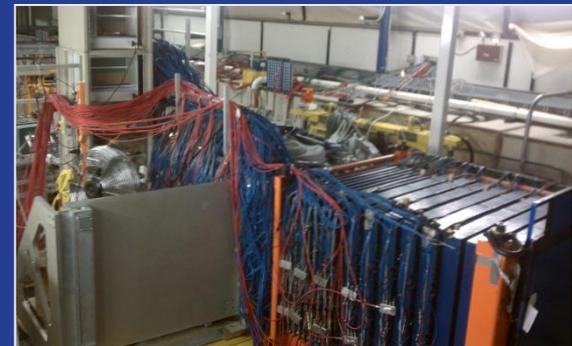


- Fermilab Experiment
- Used 3 small detectors
- Determine detector type for CD-0
- Students & Post docs
- 5 US Institutions
- 1 Chinese Institution

# T-978 CALICE



- CAlorimeter for LInear Collider Experiment
- Digital Hadron Cal
- Large Experiment
- 21 Institutions
  - 9 Countries
- Record, 500+ channels



# T-1019 Belle II iTOP Counter



- Belle II imaging Time Of Propagation prototype counter
- Large Detector
  - damaged during shipping
  - Able to repair at SiDet
- 3 US Institutions
- 1 Japanese
- Worked over Christmas

# EDIT 2012



- 64 Students
- 10 days of hands-on experience – including 2 days in the Test Beam
- Set up detectors (provided by facility)
- Studied Beam
- High ratings from students
- Test Beam was favorite track



# FTBF Institutions in FY2012

- Argonne National Laboratory
- Carnegie Mellon University
- CIEMAT/Madrid
- Cornell
- DESY/Hamburg
- Fermilab
- Imperial College London
- Indiana University of South Bend
- INFN and University Roma I
- INFN Ferrara
- INFN Lecce
- INFN Napoli
- INFN Padova
- INFN Trieste
- INPL/Lyon
- ITEP Moscow
- Kansas State University
- LAL/Orsay
- LLR - Ecole Polytechnique/Paris
- LPC/Clermont-Ferrand
- LPSC/Grenoble
- Nagoya University
- Northern Illinois University
- Ohio State University
- Pacific Northwest National Laboratory
- Pennsylvania State University
- Princeton
- Purdue
- Royal Holloway University of London
- Rutgers
- Saclay/IRFU
- Shanghai
- Shinshu University
- SNOLAB
- Stanford Linear Accelerator Center
- SUNY
- Syracuse
- Texas A&M
- UC Louvain
- Università degli Studi di Milano
- University College London
- University of Hawaii
- University of Alberta
- University of Bergen
- University of Birmingham
- University of California, Los Angeles
- University of Cambridge
- University of Chicago
- University of Cincinnati
- University of Colorado
- University of Cyprus
- University of Hawaii
- University of Heidelberg
- University of Iowa
- University of Kentucky
- University of Kobe
- University of Modena
- University Of Prague
- University of Rome
- University of Salerno
- University of Texas, Arlington
- University of Udine
- University of Virginia
- University of Washington

## Upgrades during shutdown

- Upgrade & expand patch panel systems
- Upgrade laser alignment system
- Increase cooling capacity for SiPM's
- Upgrade tracking system & New Read Out
- New larger aperture Strip Telescope
- Improve communication system  
between control rooms and beam enclosures
- Massive clean-up, organization & Maintenance

# Facility Expansion

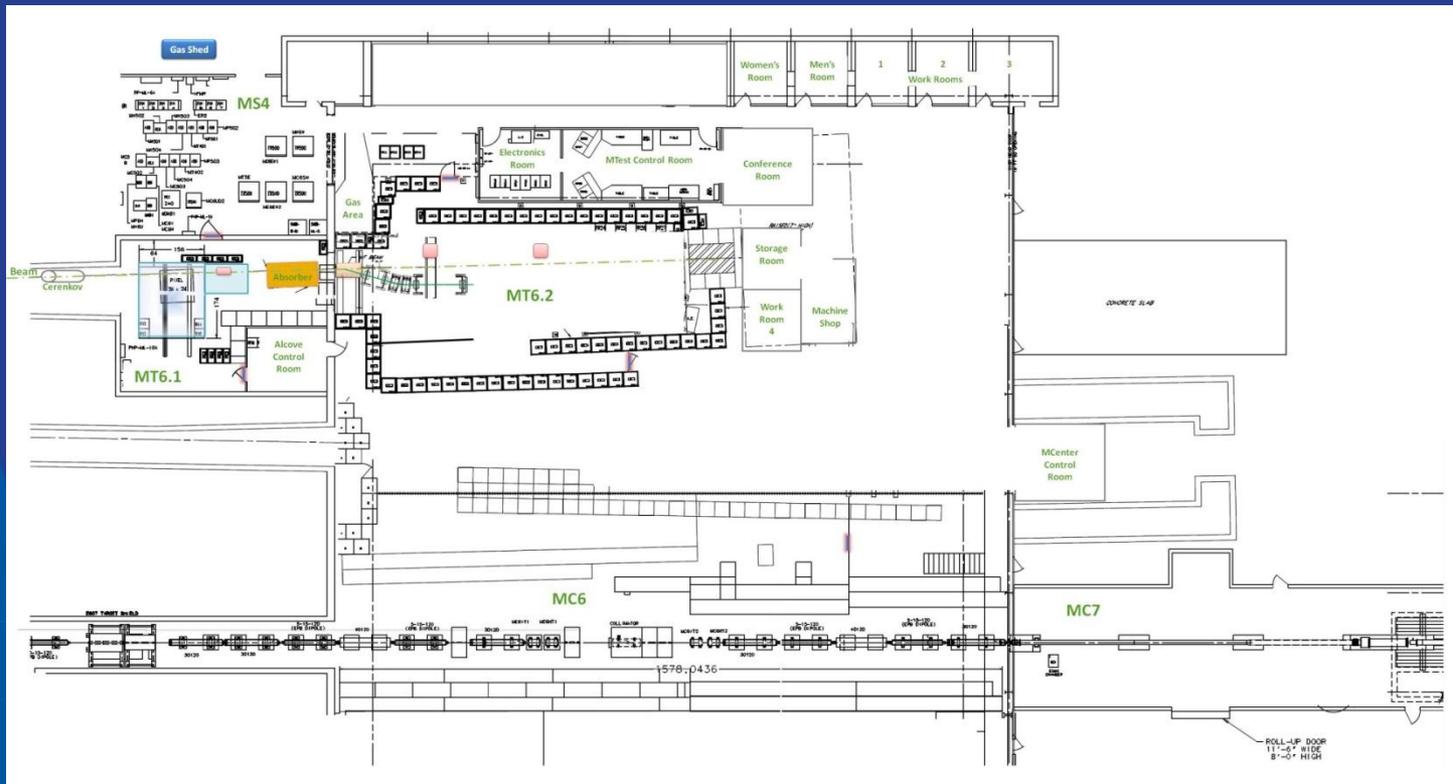
- Support staff increased after Tevatron shutdown
- MCenter Beamline
  - Support large & long term experiments
    - Liquid Argon TPC Detectors
    - NOvA Calibration
    - MINERvA upgrade calibration
  - Dedicated lower energy beamline (200 MeV – 20 GeV)

# Summary

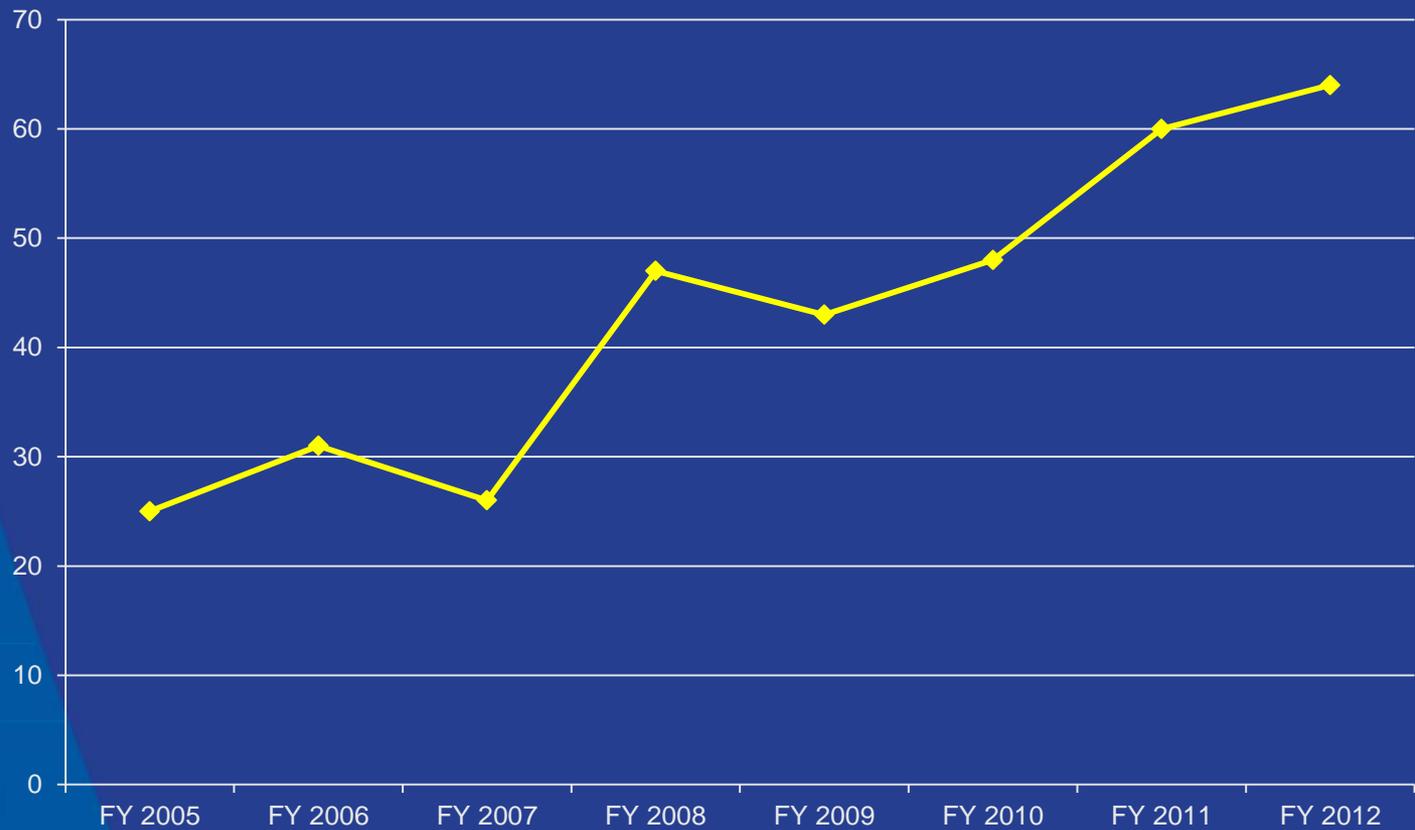
- Only High Energy Hadron Test Beam in US
- Extensive infrastructure
- Serve over 200 collaborators a year, from over 60 institutions
- Need to expand to keep up with user demand

# ADDITIONAL SLIDES

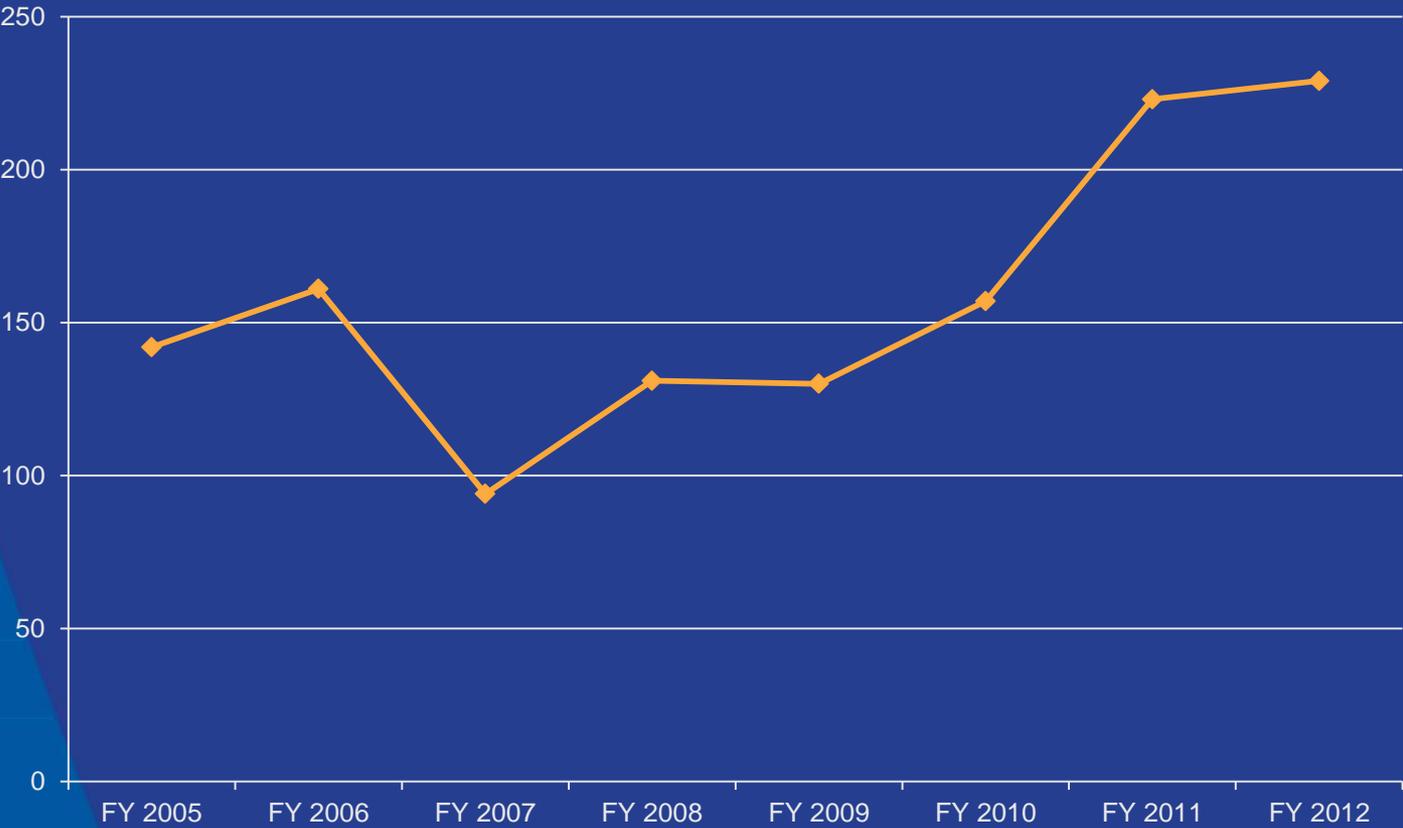
# Facility Overview



# Institutions



# Collaborators



# Beam Availability

- Beam 365 days a year
- Blocks of 7 days (usually includes 1 day of installation)
- Wednesday – Tuesday
  
- Beam 24 hours/day
- 12 hour shifts
  
- Control room must be staffed during beam hrs

# Beam Structure

- 19 nsec from Booster acceleration
- 53 MHz from MI acceleration
- Up to 35% double occupancy from extraction

# Facility Amenities

- Multiple Control rooms
- Conference room (w/video)
- Quick repair work area
- Work areas
  - Static sensitive
  - Cosmic telescopes
- Storage

# Facility Support

- Facility Manager – Aria Soha (I&TB)
- Assistant Manager –
- Deputy Manager – JJ Schmidt (I&TB)
- Technical Coordinator – Todd Nebel (I&TB)
  - Mech Support – Jerry Taccki (I&TB)
- Instrumentation Specialist – Ewa Skup (DDO)
- DAQ Specialist – Geoff Savage (EED/OS)
- Other support (Elec, PREP, Safety, etc) as needs arise

# EDIT 2012 Results

- A written survey was taken of the students. 29 of the 64 students turned in a completed survey.
- On a scale of 1 (Did not meet expectations) to 5 (Exceeded expectations), there were 18 that scored the school a 5, and 10 that scored the school a 4. There were no scores below a 4.
- The favorite tracks were Test Beam and Silicon Detectors
- Some comments:
  - “The symposium was incredible!”
  - “The school was very well organized”
  - “I have never felt so comfortable asking questions”
  - “Was a bit difficult to fit into 2 weeks. Maybe a longer school would go into more details”
  - “I would suggest more women as TA’s”
  - “Tour day was super awesome but a bit exhausting. A tour day at the end would have been more interesting.”
  - “It would have been nice to have an extra half-hour free at lunch to talk with colleagues”
  - “I’d suggest homework!”